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Forest Pest Management

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BIOLOGICAL
EVALUATION R2-76-4

MOUNTAIN PINE BEETLE

National Forest Lands
Colorado Front Range

Arapaho and Roosevelt
and
Pike and San Isabel
National Forests
July 1976

Rocky Mountain Region

U.S. Department of Agriculture Forest Service

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The mountain pine beetle, Dendroctonus ponderosae Hopkins, continues to cause heavy ponderosa pine mortality on National Forest lands along the Front Range of the Rocky Mountains in Colorado and extreme Southern Wyoming. Ponderosa pine mortality is primarily occurring in overstocked stands and on poor sites as far south as Westcliff and north to just beyond the Wyoming State Line. Losses due to the 1975-1976 mountain pine beetle generation were estimated to be about 850,000 trees (Cahill, 1975).

On June 21-25, a mountain pine beetle brood survey was conducted to evaluate the overwintering population on National Forest lands and predict the trend of the infestation in 1976. Utilizing Knights (1960) "Sequential Sampling of Black Hills Beetle Population," which is based on bark samples, the trend of the current infestation was determined at 11 locations on the Arapaho and Roosevelt National Forests and 6 locations on the Pike and San Isabel National Forests (Table 1). Brood samples from all areas showed that the population level was increasing. The mountain pine beetle is again expected to cause epidemic ponderosa pine losses on poor sites and in overstocked stands.

TECHNICAL INFORMATION

Causal Agent: Dendroctonus ponderosa Hopkins, mountain pine beetle.

Host: Pinus ponderosa Laws, ponderosa pine.

Extent of Infestation: Ponderosa pine mortality occurs in overstocked stands and on poor sites along the Front Range of the Rocky Mountains in Colorado and extreme Southern Wyoming.

Life History: The mountain pine beetle has one generation per year. Adults attack trees mid-July through early September by boring through the bark to the cambium, then tunnel upward for 12 inches to 30 inches. The females lay eggs in individual niches along each side of the gallery which is then packed with partially-digested wood particles called frass. After hatching, the larvae feed in individual channels at right angles to the egg gallery in the phloem. The insect overwinters in the larvel stage. In the spring, when the larvae are fully developed, they excavate an oval chamber at the end of the larval gallery and pupate. Mature adults emerge from these chambers by boring to the outer bark surface, fly to attack new trees, and start another generation.

METHODS

Two 6-by-6-inch bark samples were taken at d.b.h. on opposite sides of currently-infested ponderosa pine trees at 11 locations on the Arapaho and Roosevelt National Forests and at 6 locations on the Pike and San Isabel National Forests. For each sample, the total number of brood, regardless of stage, inches of egg gallery, and number of each species of predators and parasititoids, were tabulated. In addition, at each sample location, the basal area of the sampled location, including currently-infested and uninfested trees was measured, and the degree

of woodpeckering noted. Using Knights (1960) sequential sampling plan, the trend of the beetle population at each sample area was categorized as decreasing, static, or increasing.

RESULTS

At all of the 17 sample locations, brood numbers showed an increasing trend for 1976. Predators, parasitoids, and woodpeckers appear to be causing little brood mortality. Data from all sample locations is summarized in Table 1. All samples were taken on National Forest lands. Monitoring of the infestation on private and State of Colorado lands is primarily the responsibility of the Colorado State Forest Service.

From this year's brood survey, it can be generalized that the entire infestation on National Forest lands along the Front Range is expected to continue to cause epidemic losses in 1976-1977. Although the infestation is at epidemic levels, losses are occurring primarily to trees on poor sites and in overstocked stands which possess certain physiological characteristics conducive to insect attack, such as slow annual growth and stagnation. The recommended long-term protection measure to reduce beetle attacks within a given stand is to reduce the basal area to 80 sq. ft./acre. Silvicultural thinning will have a relieve effect on the stand enabling the remaining growing stock to increase its growth rate and remain beetle free. This type of silvicultural management will require periodic re-entry to keep stands thinned to this level.

Forest Insect and Disease Management personnel will continue to monitor the population in the fall of 1976 using aerial surveys and ground strip cruises.

REFERENCES CITED

Cahill, D. B. 1975. Mountain Pine Beetle, Colorado Front Range, Arapaho and Roosevelt, Pike and San Isabel National Forests, and the Rocky Mountain National Park. USDA, Forest Service, State and Private Forestry, R2-75-22. 4 p. Biological Evaluation.

Knight, F. B. 1960. Sequential Sampling of Black Hills Beetle Populations. USDA, Forest Service, Rocky Mountain Forest and Range Experiment Station Research Note Number 48, 8 p.

TABLE 1 SUMMARY OF THE MOUNTAIN PINE BEETLE BROOD SURVEY, JUNE 1976

AREA	# TREES SAMPLED	AVE. DBH (INCHES)	TOTAL BROOD	AVERAGE BROOD 6x6	AVERAGE IN. GAL. 6x6	AVERAGE # CLERIDS 6x6	AVERAGE # MEDETERA 6x6	WOODPECKERING	(FT.2/ACRE) BASAL AREA	SITE	(FEET) ELEVATION	POPULATION TREND
Arapaho & Roosevelt National Forests												
Mill Creek T. 12 N., R. 73 W., Sec. 36	10	11.5 ± .9	501	25.1 ± 3.4	33.0 ± 2.5	0.0 ± 0.0	0.0 ± 0.0	NONE	140	40.0	7300	INCREASING
Praire Divide T. 10 N., R. 72 W., Sec. 08	16	11.1 ± .6	438	12.8 ± 2.2	33.1 ± 1.8	.03 ± .03	.03 ± .03	NONE	130	31.1	7850	INCREASING
Red Feather Lakes T. 12 N., R. 73 W., Sec. 36	12	12.1 ± .7	338	14.1 ± 2.5	29.1 ± 1.5	0.0 ± 0.0	0.0 ± 0.0	NONE	140	47.7	8240	INCREASING
Rustic T. 9 N., R. 73 W., Sec. 28	10	10.6 ± .8	431	21.6 ± 2.9	34.2 ± 2.3	0.0 ± 0.0	0.0 ± 0.0	NONE	170	50.0	7500	INCREASING
Kelly Flats T. 8 N., R. 72 W., Sec. 08	11	14.3 ± .6	328	14.9 ± 2.4	36.5 ± 1.6	0.0 ± 0.0	.50 ± .18	LIGHT	190	39.6	7800	INCREASING
Stove Prairie T. 8 N., R. 71 W., Sec. 25	10	13.7 ± .5	482	24.1 ± 5.1	25.5 ± 2.4	.45 ± .31	.60 ± .31	LIGHT	110	50.3	5450	INCREASING
Buckhorn Canyon T. 7 N., R. 71 W., Sec. 14	10	11.6 ± .7	517	25.9 ± 3.5	28.8 ± 2.1	.10 ± .01	.10 ± .01	NONE	170	46.3	7000	INCREASING
Cedar Park T. 6 N., R. 71 W., Sec. 21	17	12.0 ± .4	448	13.2 ± 2.8	33.9 ± 1.6	0.0 ± 0.0	.44 ± .24	NONE	100	61.6	7400	INCREASING
Elk Meadows T. 4 N., R. 71 W., Sec. 36	11	10.8 ± .6	361	16.4 ± 2.7	26.9 ± 2.5	0.0 ± 0.0	0.0 ± 0.0	LIGHT	80	28.5	5500	INCREASING
Jamestown T. 2 N., R. 71 W., Sec. 20	10	14.5 ± .8	373	18.7 ± 3.7	32.4 ± 1.7	0.0 ± 0.0	.05 ± .05	NONE	110	43.8	7500	INCREASING
Gross Peservoir T. 1 S., R. 71 W., Sec. 07	10	12.1 ±1.0	349	17.5 ± 3.4	29.9 ± 2.1	0.0 ± 0.0	0.0 ± 0.0	NONE	80	42.5	7200	INCREASING
Pike & San Isabel National Forests												
Wigwam Picnic Ground T. 9 S., R. 71 W. Sec. 33	10	11.8 ± .7	354	17.8 ± 3.9	25.8 ± 1.8	.15 ± .11	0.0 ± 0.0	LIGHT	80	45.35	7800	INCREASING
Wilkerson Pass T. 12 S., R. 73 W., Sec. 01	10	10.8 ± .5	418	20.9 ± 4.7	28.8 ± 1.8	0 ± 0.0	0.0 ± 0.0	LIGHT	80	41.67	9300	INCREASING
Rainbow Falls Park T. 10 S., R. 69 W., Sec. 27	10	13.6 ± .8	351	17.6 ± 2.9	25.0 ± 1.8	.15 ± .15	.15 ± .12	LIGHT	90	51.76	7600	INCREASING
Balman Reservoir Area T. 46 N., R. 12 E., Sec. 06	10	16.2 ±1.0	357	17.8 ± 3.7	35.0 ± 1.7	.60 ± .24	0.0 ± 0.0	MODERATE	110	64.13	8050	INCREASING
Bailey Picnic Ground T. 7 S., R. 73 W., Sec. 25	10	13.4 ±1.0	402	20.1 ± 3.4	23.8 ± 1.3	.25 ± .10	.10 ± .07	NONE	90	36.36	8000	INCREASING
Kelsey Campground T. 8 S., R. 70 W., Sec. 31	10	16.4 ±1.3	376	18.8 ± 3.6	26.4 ± 1.6	.65 ± .26	.25 ± .12	NONE	110	46.43	7800	INCREASING
TOTAL	187		6824			48	52					
AVE. & S. E.	11.00 ± .52	12.64± .22		18.16± .81	30.17± .49	.13 ± .03	.14 ± .03		116.47 ± 8.49/45.12±2.24/7488±221			
RANGE	10 - 17	7.6 -24.2		0 - 78	0 - 57	0 - 6	0 - 6		80 - 190	28.5-61.6	5500-9300	